

NEW SUBGENERA OF NORTH AMERICAN CRANE FLIES (TIPULIDAE: DIPTERA)¹

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In the continuing studies on North American crane flies several new subgeneric groups have been found, five of which, belonging to the genera *Limnophila* and *Erioptera*, are described at this time. It is only in recent years that full attention had been directed to the use of male hypopygial characters in the definition of such groups and important characters have been utilized, including especially the aedeagus and its subtending gonapophyses in the central or phallosomic region.

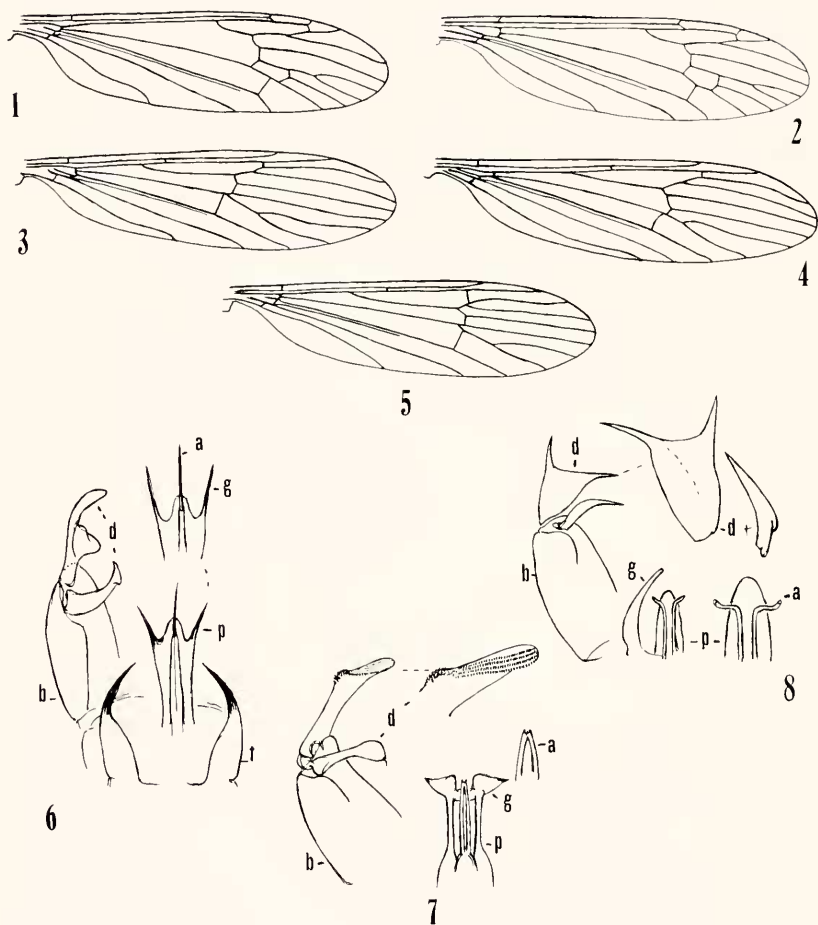
Limnophila Macquart

Limnophila Macquart; Histoire naturelle des Insectes, Diptères, 1: 95; 1834.

Limnophila is a large and involved group of Hexatome flies, the exact components of which have been poorly understood and appreciated. In his last paper, Edwards (1938: 69-92) treating of the British species, additional to the subgenera presently retained in the genus had included some further groups that now are recognized as representing valid genera, as *Pseudolimnophila* Alexander and *Pilaria* Sintenis. In the Catalogue of the Diptera of America north of Mexico (1965) by Alan Stone and co-authors (reference at conclusion of paper) there were included in *Limnophila* the following subgenera, *Lasiomastix* Osten Sacken, *Eutonia* van der Wulp, *Prionolabis* Osten Sacken, *Idiolimnophila* Alexander, *Eloeophila* Rondani, *Dicranophragma* Osten Sacken, *Idioptera* Macquart, *Phylidorea* Bigot, and *Den-*

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FIGURES 1-8. FIG. 1. *Limnophila* (*Atopolimnophila*) *laricicola* Alexander; venation. FIG. 2. *Limnophila* (*Phylidorca*) *ferruginea* (Meigen); venation. FIG. 3. *Erioptera* (*Teucherioptera*) *chrysocoma* Osten Sacken; venation. FIG. 4. *Erioptera* (*Hespererioptera*) *oregonensis* Alexander; venation. FIG. 5. *Erioptera* (*Lepidocyphona*) *rubia* Alexander; venation. FIG. 6. *Erioptera* (*Teucherioptera*) *chrysocoma* Osten Sacken; male hypopygium. FIG. 7. *Erioptera* (*Hespererioptera*) *oregonensis* Alexander; male hypopygium. FIG. 8. *Erioptera* (*Lepidocyphona*) *rubia* Alexander; male hypopygium. (Symbols: Male hypopygium—*a*, aedeagus; *b*, basistyle; *d*, dististyles; *g*, gonapophyses; *p*, phallosome; *t*, ninth tergite).

drolimmophila Alexander. Two further such groups are defined at this time, *Atopolimmophila* and *Euphylidorea*.

Limnophila (Atopolimmophila) SUBGENUS NEW

Atopolimmophila, Alexander, New Subgenus.

Type: Limnophila laricicola Alexander (Eastern North America).

Limnophila laricicola Alexander; Psyche, 19: 167, plate 13, fig. 4 (wing); 1912.

Limnophila (Limnophila) laricicola Alexander; Connecticut Geol. and Nat. Hist.

Survey, Bull. 64: 407, fig. 45, Q; 1942.

Antenna of male moderately elongate, extending to shortly beyond base of abdomen. Wing (Fig. 1). Male hypopygium (Fig. 9) with tergite, *t*, and ninth sternite united, posterior border of tergite with two narrow rods that are separated by a transverse central emargination. Basistyle, *b*, with outer apical angle produced into a long slender spinelike rod. Both dististyles, *d*, forked outwardly, outer style glabrous, outer branch an acute point, the longer inner extension microscopically divided; inner style conspicuously setiferous on proximal two-thirds, outwardly divided into a long acute spine and a broader pale blade, the tip obtuse. Phallosome with aedeagus, *a*, long and slender, slightly exceeding the dististyles, apex simple; gonapophyses, *g*, appearing as small weak slender rods at base of aedeagus.

The subgenus *Idiolimmophila* Alexander (type, *emmelina* Alexander), likewise has the outer dististyle bifid, differing from the present fly in venation and in the structure of the phallosome.

Limnophila (Phylidorea) Bigot

Phylidorea Bigot; Ann. Soc. Ent. France, Ser. 3, 2: 456; 1854.

Type: Limnophila (Phylidorea) ferruginea (Meigen). (Europe).

Limnobia ferruginea Meigen; Syst. Besch. zweifl. Ins., 1: 128; 1818.

Phylidorea ferruginea Coquillett; Proc. U. S. Nat. Mus., 37: 590; 1910.

Limnophila (Phylidorea) ferruginea (Edwards); Trans. Soc. British Ent., 5, part 1: 73; 1938.

Wing (Fig. 2). Male hypopygium (Fig. 10) with tergite, *t*, transverse, posterior border very gently emarginate medially, without projections, with coarse yellow setae concentrated at midportion. Outer dististyle, *d*, slender, apex bilobed, with a further slender extension. Phallosome, *p*, with aedeagus, *a*, long and slender, narrowed very gradually to the simple apex; gonapophyses, *g*, entirely separated from the aedeagus, including an outer flattened blade and a more mesal slender spine.

As construed by all recent students of the family, *Phylidorea* had

included not only the subgenotype above defined, as designated by Coquillett in the reference cited, but likewise a considerable number of Holarctic species, with the greatest concentration in North America. It now appears that virtually all of the names listed under *Phylidorea* in the Stone Catalogue above mentioned actually fall in the new subgenus here defined and will be found listed under that name. Possibly only *fratria* Osten Sacken and *lutea* Doane, both with the aedeagus simple as in the subgenotype of *Phylidorea*, may be retained in this group.

***Limnophila* (*Euphylidorea*) SUBGENUS NEW**

Type: Limnophila niveitarsis Osten Sacken (Eastern North America).

Limnophila niveitarsis Osten Sacken; Mon. Diptera North America, 4: 209-210; 1869.

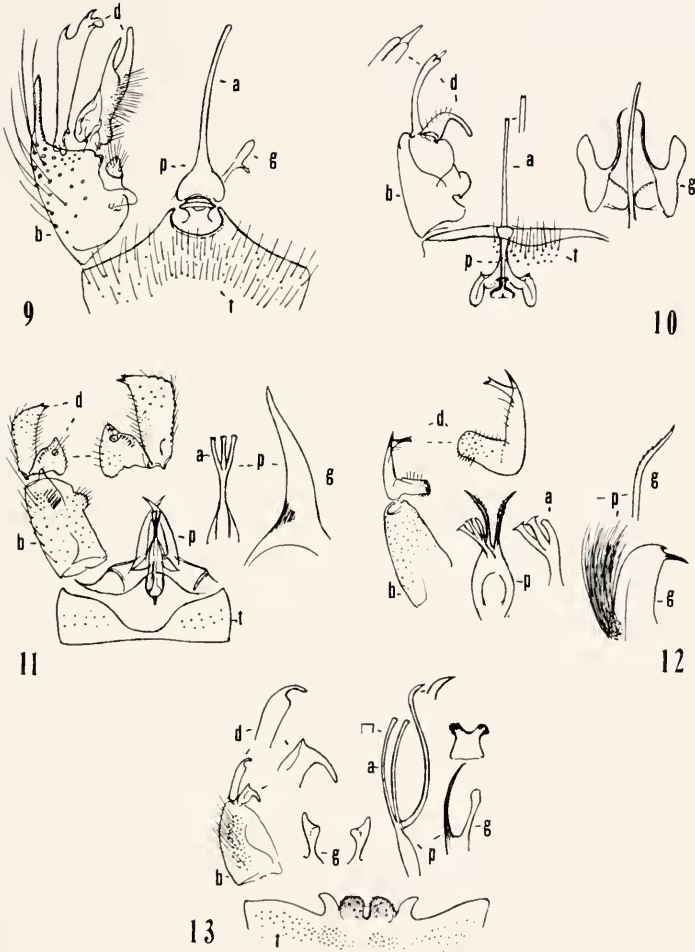
Limnophila (*Limnophila*) *niveitarsis* Alexander; Connecticut Geol. and Nat. Hist. Survey, Bull. 64: 407, fig. 45, R; 1942.

In its general structure, including venation, essentially as in *Phylidorea*, differing in hypopygial characters, especially the trifold apex of the aedeagus.

Male hypopygium (Fig. 11) of *niveitarsis* with both dististyles, *d*, stout, apex shallowly bifid, inner style broader at outer end, its outer margin with blackened spinoid setae. Basistyle, *b*, with a few strong blackened setae near outer end. Phallosome, *p*, with the aedeagus, *a*, terminating in three subequal branches that are shorter than the common stem.

Other closely related species include *albipes* Leonard, 1913; *cherokeensis* Alexander, 1940, and *globulifera* Alexander, 1941, all of eastern North America. For comparison with the type, the hypopygium of *albipes* is described and figured. Male hypopygium (Fig. 12) with outer dististyle, *d*, slender, apex very shallowly bifid, with an acute spine before apex. Phallosome, *p*, with aedeagus, *a*, short, at apex trifold into three subequal branches. Two pairs of gonapophyses, *g*, the inner set appearing as slender blackened spines, lateral apophyses large and flattened, outwardly extended into a slender spine, at base with a brush of abundant very long yellow setae.

Besides the above I am referring to this subgenus the more numerous species hitherto placed in *Phylidorea*, as stated above. The North American species in this category center about *Limnophila* (*Phyli-*



FIGURES 9-13. FIG. 9. *Limnophila (Atopolimnophila) laricola* Alexander; male hypopygium. FIG. 10. *Limnophila (Phylidorea) ferruginea* (Meigen); male hypopygium. FIG. 11. *Limnophila (Euphylidorea) niveitarsis* Osten Sacken; male hypopygium. FIG. 12. *Limnophila (Euphylidorea) albipes* Leonard; male hypopygium. FIG. 13. *Limnophila (Euphylidorea) adusta* Osten Sacken; male hypopygium.
 (Symbols: Male hypopygium—*a*, aedeagus; *b*, basistyle; *d*, dististyles; *g*, gonapophyses; *p*, phallosome; *t*, ninth tergite).

dorea) *adusta* Osten Sacken, the best known single species, its hypopygium being shown for comparison (Fig. 13). In this species and several related forms the trifold condition of the aedeagus is more accentuated than in the type and the two lateral branches differ in appearance from the central or functional filament. In the Nearctic fauna, the following species have the three branches of the aedeagus long and slender, about as in *adusta*—*aequiatra* Alexander, *aleutica* Alexander, *burdicki* Alexander, *flavapila* Doane, *neadusta* Alexander, *nevadensis* Alexander, *olympica* Alexander, *pacalis* Alexander, *paenulata* Alexander, *snoqualmiensis* Alexander, *strepens* Alexander, and *tepidata* Alexander. A further extensive group have the three branches of the aedeagus shorter but still much longer than in the subgenotype and its close allies and with the lateral pair evidently nonfunctional. In the Nearctic fauna these include *adustoides* Alexander, *auripennis* Alexander, *breviflora* Alexander, *caudifera* Alexander, *consimilis* Dietz, *epimicta* Alexander, *fumidicosta* Alexander, *iowensis* Alexander, *luteola* Alexander, *nigrogeniculata* Alexander, *persimilis* Alexander, *semifacta* Alexander, and *similis* Alexander. Still a third group has the various elements comprising the aedeagus more modified, such species being *siouana* Alexander, *stupkai* Alexander, *novaeangliae* Alexander, and *terracnovae* Alexander. In the European fauna *meigenii* Verrall and *phaeostigma* (Schummel) closely approach the type found in *adusta*; *fulvonervosa* (Schummel) is most similar to *terracnovae*; *aperta* Verrall, *dispar* (Meigen), and *lineola* (Meigen) are evidently members of the present subgenus rather than *Phylidorea* where presently assigned.

In the 1965 North American Catalogue (page 67) a list of species of *Limnophila* is provided where no accurate assignment to subgenus was possible at that time. Additional to the species listed above, the following may now be placed in its proper subgenus.—*amabilis* Alexander (*Afrolimnophila*); *antennata* Coquillett (*Prionolabis*); *brevifurca* Osten Sacken (*Brachylimnophila*); *claggi* Alexander (*Arctolimnophila*); *euxesta* Alexander (*Hesperolimnophila*); *irrorata* Johnson (*Afrolimnophila*); *nycteris* Alexander (*Hesperolimnophila*); *occidens* Alexander (*Brachylimnophila*); *rubida* Alexander (*Hesperolimnophila*); *subcostata* Alexander (*Arctolimnophila*).

Erioptera Meigen

Erioptera Meigen; Magazin für Insektenkunde, 2: 262; 1803.

Erioptera is a major genus of crane flies, with representatives in all biotic regions. In the 1965 North American Catalogue (pages 80-84), additional to the typical subgenus the following were included, *Trimicra* Osten Sacken, *Empedomorpha* Alexander, *Symplecta* Meigen, *Mesocyphona* Osten Sacken, *Hoplolabis* Osten Sacken, and *Psiloco-nopa* Zetterstedt. More recently *Empedomorpha* has been elevated to full generic status, as earlier had *Arctoco-nopa* Alexander, *Gonem-peda* Alexander, *Gonomyodes* Alexander, and *Hesperoconopa* Alexander, all originally defined as subgenera in *Erioptera*. Three further such groups are defined at this time, *Teucheroptera*, *Hespererioptera* and *Lepidocyphona*.

Erioptera (Teucheroptera) SUBGENUS NEW

Type: Erioptera chrysocoma Osten Sacken (Eastern North America).

Erioptera chrysocoma Osten Sacken; Proc. Acad. Nat. Sci. Philadelphia for 1859: 226; 1859.

Erioptera (Erioptera) chrysocoma Alexander; Connecticut Geol. and Nat. Hist. Survey, Bull. 64: 448, 450, figs. 50, D (venation), 51, E (male hypopygium); 1942.

Wing (Fig. 3). Male hypopygium (Fig. 6) with tergite, *t*, including two lateral lobes that are extended caudad into long black spines. Both dististyles, *d*, simple, pale, mesal face of outer style on basal half with a large flattened lobe. Phallosome, *p*, distinctive, including the slender aedeagus, *a*, that narrows on about the outer third into a single straight blackened spine; gonapophyses, *g*, including a depressed flattened plate, the margins extended into straight blackened spines, in conformation similar to the apex of the aedeagus. In the Alexander 1942 paper above cited the structures here interpreted as being tergal lobes were considered as being basal gonapophyses but appear to represent tergal structures.

The only other member of the subgenus presently known is *Erioptera (Teucheroptera) chrysocomoides* Alexander, likewise from eastern North America. The hypopygium of this is generally as in the subgenotype, differing especially in the conformation of the spines of the tergal lobes, which are stouter with the apex narrowed abruptly into a short spine, at its base with a concentration of short setae. The aedeagus is longer and more slender than the gonapophyses. The hypopygium of *chrysocomoides* is shown in the Connecticut Bulletin above cited, p. 451, fig. 51, F.

Erioptera (Hespererioptera) SUBGENUS NEW

Type: Erioptera oregonensis Alexander (Western North America).

Erioptera (Erioptera) oregonensis Alexander; Pomona College Jour. Ent. and Zool., 12: 87-88; 1920.

Erioptera (Erioptera) oregonensis Alexander; Bull. California Insect Survey, 8, The crane flies of California: 135, fig. 460 (male hypopygium); 1967.

Type from Tillamook, Oregon; known also from California.

In general appearance close to typical *Erioptera*, differing evidently in hypopygial structure, including especially both dististyles and the phallosome.

Wing (Fig. 4). Male hypopygium (Fig. 7) with tergite pale, unmodified. Basistyle, *b*, produced slightly beyond the insertion of the dististyles. Outer dististyle, *d*, long and nearly straight, at near two-thirds the length the outer margin with a low tubercle that is provided with several short setae, outer third of style long, flattened, with four parallel longitudinal rows of long delicate spines, extending from near the tubercle distad to the apex, each row comprising about 100 or more such spines; inner style about two-thirds as long, the outer third dilated into an oval glabrous blade with a single strong seta near apex. Phallosome, *p*, with aedeagus long and slender, straight, with a penial filament inside each margin, extending parallel to one another to near the apex where they converge and open into a single terminal aperture; each gonapophysis, *g*, with stem long and narrow, at apex dilated into a triangular blade that narrows into an acute more darkened point, near outer ends the apophyses interconnected by a straplike transverse band.

Erioptera (Lepidocyphona) SUBGENUS NEW

Type: Erioptera rubia Alexander (Southwestern United States).

Erioptera (Mesocyphona) rubia Alexander; Proc. Acad. Nat. Sci. Philadelphia for 1914: 583, plate 26, fig. 12 (wing); 1914.

Type from the Chiricahua Mountains, Cochise County, Arizona; known also from Utah and Colorado.

Wing (Fig. 5) with cell M_2 open by the atrophy of *m*; in subgenus *Mesocyphona* open by atrophy of basal section of M_3 or (*melanderiana* Alexander) closed. Legs with abundant long narrow scales additional to normal strong black setae; wings with similar elongate scales, those comprising the costal fringe slightly narrower to appear more setoid; posterior border of wing with a single row of appressed similar scales and much longer very delicate setae. Male hypopygium (Fig. 8) very similar to that of *Mesocyphona*. Dististyles, *d*, terminal; outer style with body stout, extended into two long acute spines, the terminal one slightly longer than the lateral; inner style a slightly longer and stouter similar spine. Phallosome, *p*, with aedeagus, *a*, terminating in a small caplike structure,

penis profoundly bifid, each strongly recurved at apex; gonapophysis, *g*, a strong spinelike rod, stout basally, narrowed into a slender spine.

The subgenus is closest to *Mesocyphona* Osten Sacken, differing most evidently in the venation and in the presence of scales on the legs and wing veins. The genus *Erioptera* Alexander (1970:47) has somewhat comparable scales on the legs but lacking these on the wing veins, and with the structure of the male hypopygium quite distinct.

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2.0133 New subgenera of North American crane flies (Tipulidae: Diptera).

ABSTRACT.—Five new subgeneric names are proposed for North American crane flies belonging to the subgenera *Limnophila* Macquart and *Erioptera* Meigen, these being *Limnophila* (*Atopolimnophila*), *Limnophila* (*Euphylidorea*), *Erioptera* (*Teucherioptera*), *Erioptera* (*Hespererioptera*), and *Erioptera* (*Lepidocyphona*). The type species of *Limnophila* (*Phylidorea*), *ferruginea* (Meigen), of Europe, is redescribed and figured. In the genus *Limnophila* a small number of species that previously had not been assigned to subgenus are listed under these names.—CHARLES P. ALEXANDER, 39 Old Town Road, Amherst, MASS 01002.

Descriptors: Diptera; Tipulidae; crane flies, North America; new subgenera of Tipulidae, North America.